Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (original): A fuel cell, comprising:

a membrane electrode assembly, wherein the membrane electrode assembly comprises:

an anode,

a cathode, and

an electrolyte disposed between and in intimate contact with the anode and the cathode; and

a layer of porous gas diffusion material disposed on a first surface of the membrane electrode assembly;

wherein porosity of the porous gas diffusion material at localized areas on the porous gas diffusion layer decreases from a first value to a second value in response to a decrease in temperature at corresponding areas on the membrane electrode assembly adjacent to the porous gas diffusion layer.

2. (original): The fuel cell as described in claim 1, wherein the layer of porous gas diffusion material is electrically conductive and is in thermal contact with the first surface of the membrane electrode assembly.

3. (original): The fuel cell as described in claim 2, further comprising a current collector, wherein the porous gas diffusion layer is interposed between the current collector and the membrane electrode assembly.

4. (original): The fuel cell as described in claim 1, wherein the porous gas diffusion material further comprises a layer made of electrically conductive materials distributed such that the resulting layer is micro or nano porous.

5. (original): The fuel cell as described in claim 4, wherein the electrically conductive materials is a combination of one or more elements selected from the group consisting of metal fibers exhibiting positive coefficient of thermal expansion, polymer fibers exhibiting positive coefficient of thermal expansion, thermoresponsive polymers exhibiting positive swelling in gel form, thermoresponsive polymers exhibiting positive swelling in fibrous form, thermoresponsive polymers exhibiting negative swelling in gel form and thermoresponsive polymers exhibiting negative swelling in fibrous form.

6. (original): The fuel cell as described in claim 1, wherein the porous gas diffusion material further comprises:

a core layer made of materials distributed such that the resulting layer is micro or nano porous; and

a conductive material disposed over or embedded in the core layer such that the resulting layer is electrically conductive.

7. (original): The fuel cell as described in claim 6, wherein the core layer material is a combination of one or more elements selected from the group consisting of metal fibers exhibiting positive coefficient of thermal expansion, polymer fibers exhibiting positive coefficient of thermal expansion, thermoresponsive polymers exhibiting positive swelling in gel form, thermoresponsive polymers exhibiting positive swelling in fibrous form, thermoresponsive polymers exhibiting negative swelling in gel form and thermoresponsive polymers exhibiting negative swelling in fibrous form.

8. (currently amended): The fuel cell as described in claim 1, wherein the membrane electrode assembly comprises the first surface and a second opposing surface, the fuel cell further comprising a current collector interposed between the porous gas diffusion layer disposed on the first surface and a the second opposing surface of the membrane electrode assembly.

9. (original): The fuel cell as described in claim 1, wherein porosity of the porous gas diffusion material at localized areas on the porous gas diffusion layer further decreases from the first value to the second value in response to a trigger condition at corresponding areas on the membrane electrode assembly adjacent to the porous gas diffusion layer,

wherein the trigger condition is created in response to a combination of one or more elements selected from the group consisting of temperature, pH, hydrogen concentration, electrolyte water content, electrolyte thickness, electrolyte ionic conductivity and electrolyte electronic conductivity of the membrane electrode assembly adjacent to the porous gas diffusion layer, crossing a threshold value.

10. (original): A fuel cell, comprising:

a membrane electrode assembly, wherein the membrane electrode assembly comprises:

an anode,

a cathode, and

an electrolyte disposed between and in intimate contact with the anode and the cathode; and

a layer of variable porosity gas diffusion material disposed on a first surface of the membrane electrode assembly;

wherein porosity of the variable porosity gas diffusion material at localized areas on the variable porosity gas diffusion layer correlates to a temperature differential from a threshold value at corresponding areas on the membrane electrode assembly side adjacent to the variable porosity gas diffusion layer, and further wherein the porosity of the porous gas diffusion material decreases as the temperature differential increases.

11. (original): The fuel cell as described in claim 10, wherein the layer of variable porosity gas diffusion material is electrically conductive and is in thermal contact with the first surface of the membrane electrode assembly.

12. (original): The fuel cell as described in claim 11, further comprising a current collector, wherein the variable porosity gas diffusion layer is interposed between the current collector and the membrane electrode assembly.

13. (original): The fuel cell as described in claim 10, wherein the variable porosity gas diffusion material further comprises a layer made of electrically conductive materials distributed such that the resulting layer is micro or nano porous.

14. (original): The fuel cell as described in claim 13, wherein the electrically conductive material is a combination of one or more elements selected from the group consisting of metal fibers exhibiting positive coefficient of thermal expansion, polymer fibers exhibiting positive coefficient of thermal expansion, thermoresponsive polymers exhibiting positive swelling in gel form, thermoresponsive polymers exhibiting positive swelling in fibrous form, thermoresponsive polymers exhibiting negative swelling in gel form and thermoresponsive polymers exhibiting negative swelling in fibrous form.

15. (original): The fuel cell as described in claim 10, wherein the variable porosity gas diffusion material further comprises:

a core layer made of materials distributed such that the resulting layer is micro or nano porous; and

a conductive material disposed over or embedded in the core layer such that the resulting layer is electrically conductive.

16. (original): The fuel cell as described in claim 15, wherein the core layer material is a combination of one or more elements selected from the group consisting of metal fibers exhibiting positive coefficient of thermal expansion, polymer fibers exhibiting positive coefficient of thermal expansion, thermoresponsive polymers exhibiting positive swelling in gel form, thermoresponsive polymers exhibiting positive swelling in fibrous form, thermoresponsive polymers exhibiting negative swelling in gel form and thermoresponsive polymers exhibiting negative swelling in fibrous form.

17. (currently amended): The fuel cell as described in claim 10, wherein the membrane electrode assembly comprises the first surface and a second opposing surface, the fuel cell further comprising a current collector interposed between the variable porosity gas diffusion layer disposed on the first surface and ~~a~~ the second opposing surface of the membrane electrode assembly.

18. (original): A method of operating a fuel cell, comprising the steps of:

forming a membrane electrode assembly by disposing an electrolyte between and in intimate contact with an anode and a cathode;

disposing a layer of variable porosity material on a first surface of the membrane electrode assembly;

activating the membrane electrode assembly by supplying reactants to the membrane electrode assembly; and

selectively limiting amount of reactants reaching localized areas of the membrane electrode assembly surface using the variable porosity material, wherein the selectively limiting is accomplished by changing the porosity at localized areas of the variable porosity material from a first value to a second value in response to a decrease in temperature at areas of the membrane electrode assembly adjacent to the localized areas of the variable porosity material.

19. (original): The method of claim 18, wherein the selectively limiting is further accomplished by changing the porosity at localized areas of the variable porosity material from the first value to the second value in response to changing a combination of one or more elements selected from the group consisting of temperature, pH, hydrogen concentration, electrolyte water content, electrolyte thickness, electrolyte ionic conductivity and electrolyte electronic conductivity of the membrane electrode assembly adjacent to the variable porosity material layer, crossing a threshold value.